

In re Application of Alfred S. Gates, Jr. et al.)
Serial No. 10/799,827)
Filed: March 12, 2004)

Art Unit 1775
Examiner: Turner, Archene A.

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REMARKS

Introduction

This paper is fully responsive to the pending Office Action mailed on June 16, 2006. By this response, applicants have done the following:

- amended claim 22 to recite the grain morphology for the specific coating layers; and
- amended claim 30 to recite a “base coating layer”.

Applicants submit that the pending claims are allowable over the references of record, and solicit the issuance of a Notice of Allowance and Issue Fee Due and Notice of Allowability.

Rejection under 35 USC §112¶2nd

Claims 7, 14, 21 and 30 stand rejected under 35 USC §112¶2nd based upon the argument that it is unclear where the alumina layer is positioned with respect to the coating and the substrate. In this regard, at Paragraph [039] (page 10) of the specification, the text reads that in the case where the substrate is either PcBN or a ceramic, the base coating layer may be alumina. Applicants submit that in light of this disclosure, it is clear that the base alumina layer is a layer different from the alumina layer recited earlier in the claims. Hence, applicants respectfully submit that the claims satisfy 35 USC §112¶2nd and solicit the removal of the rejection.

The Law of Inherent Anticipation

Applicants wish to point out several important aspects of the current state of the law of inherent anticipation¹ as set forth at MPEP 2112 IV, pages 2100-47 through 2100-48 (Rev. 5 Aug. 2006). These aspects are set forth below:

¹ The discussion in the MPEP is consistent with the recent decision by the Federal Circuit in SmithKline Beecham Corp. v. Apotex Corp., 403 F.3d 1331, 74 USPQ2d 1398 (Fed. Cir. 2005), cert. denied, 547 U.S. ___ (June 19, 2006).

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- The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993)
- To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)
- The mere fact that a certain thing may result from a given set of circumstances is not sufficient. In re Robertson, *supra*.
- An invitation to investigate is not an inherent disclosure when a prior art reference discloses no more than a broad genus of potential applications of its discoveries. Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354, 71 USPQ2d 1081 (Fed. Cir. 2004).

Paragraph 6 Rejection – under 35 USC §102(b)

The Examiner has rejected claims 1-2, 4-6, 22, 23, 29-30 under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,980,988 to Ljungberg. The Examiner argues that, “[T]he morphology of the alumina layer is considered inherent to the way the layer is made.” Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

Ljungberg discloses at Column 2, lines 43-57 a process to make an alpha-alumina coating layer that has “plate-like grains with an average grain size of $L=3.5\ \mu\text{m}$ and $W=0.7\ \mu\text{m}$.” See Column 7, line 66- Column 5, line 1 and the Abstract. The Ljungberg process must satisfy the following two requirements:

- the reactant gases be sequenced in the following order: CO_2 , CO , and H_2O ; and

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- prior to the alumina nucleation, the CVD reactor atmosphere must be kept at a low oxidation potential (i.e., total concentration level of H₂O must be below 5 ppm.

Further, although the general disclosure recites the CVD temperature range as 850 °C to 1100 °C, the specific example (i.e., Example 1) calls for a temperature of 1000 °C-1030 °C (see the table at Column 4). In addition, Ljungberg requires there to be a sulfur-fluorine containing gas to be in the gas mixture (see Column 2, lines 55-57).

As will become apparent from the discussion below, the Ljungberg process is different from the process that produced the claimed invention. This difference is significant enough to negate the position that Ljungberg inherently anticipates the claimed invention.

Independent claim 1 calls for the following grain morphology:

... an alpha-alumina coating layer that exhibits a platelet grain morphology at the surface of the alpha-alumina coating layer.

Independent claim 29 calls for the following grain morphology:

... the alumina coating layer is one of the following: an alpha-alumina coating layer having a platelet grain morphology at the surface thereof, or a kappa-alumina coating layer having either a lenticular grain morphology at the surface thereof or a polyhedra-lenticular grain morphology at the surface thereof, or an alpha-kappa-alumina coating layer having either a large multifaceted grain morphology at the surface thereof or a polyhedra-multifaceted grain morphology at the surface thereof.

The processes used to apply the inventive coating layers as set forth in the specification are distinct from the Ljungberg process. For example, the temperature of the specific example in Ljungberg is at 1000-1030 °C, which is lower than the typical temperature range (i.e., 870-890 °C) of the inventive examples. The gas mixtures for the inventive examples used to apply the inventive coating layers do not contain fluorine as a component. These inventive examples do not sequence in the gases in the following

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order: CO₂, CO, and H₂O as is a requirement of Ljungberg. These differences are sufficient to negate any argument that the claimed coating layers are necessarily present in the Ljungberg example or disclosure. Based upon the mandates in MPEP 2112 IV, Ljungberg cannot inherently anticipate claims 1 and 29. For the above reasons, applicants submit that Ljungberg does not inherently anticipate the invention per claims 1 and 29, and requests the removal thereof.

Claims 2 and 4-6 depend from claim 1, and are allowable for the reasons advanced in support of claim 1. Claim 30 is dependent from claim 29 and is allowable for the reasons advanced in support of claim 29. Further, claim 30 calls for a base coating layer of alumina on the substrate. Ljungberg is silent as to this feature of the claims. Claim 30 is allowable over Ljungberg for this reason notwithstanding the fact that it depends from a claim that should be allowed.

Independent claim 22 calls for the alumina coating layer as follows with an emphasis on the deposition temperature:

... a coating scheme on the substrate wherein the coating scheme includes an alumina coating layer selected from the group comprising an alpha-alumina coating layer having a platelet grain morphology at the surface thereof and a kappa-alumina coating layer having either a lenticular grain morphology at the surface thereof or a polyhedra-lenticular grain morphology at the surface thereof and a kappa-alpha-alumina coating layer having either a large multifaceted grain morphology at the surface thereof or a polyhedra-multifaceted grain morphology at the surface thereof, and the coating layer being applied by chemical vapor deposition at a temperature ranging between about 750 degrees Centigrade and about 920 degrees Centigrade.

In light of the above-recited differences in the coating process of Ljungberg as compared to the inventive processes that apply the inventive coating layers, the above recited grain morphology of the different alumina phases cannot necessarily be present in the Ljungberg

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coating per the mandates of MPEP 2212 IV. Thus, applicants submit that Ljungberg cannot inherently anticipate the invention per claim 22..

Claim 23 depends from claim 22, and is allowable for the reasons advance din support of claim 22.

Paragraph 7 Rejection – under 35 USC §102(b)

The Examiner has rejected claims 8-9, 11,13, 14, 22, 24 and 29-30 under 35 USC §102(b) as being anticipated by the article to Ruppi et al. entitled Chemical vapour deposition of κ - Al_2O_3 . The Examiner argued that, “[T]he morphology of the alumina layer is considered inherent to the way the layer is made.” Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

The Ruppi et al. article pertains to the formation of a kappa-alumina coating layer. According to the article itself, “[T]he aim of this paper is to elucidate the influence of the process parameters (in this case the influence of H_2S doping, deposition temperature and the total pressure) on the growth and microstructure of κ - Al_2O_3 . See page 51 of the Ruppi et al. article. In regard to the morphology of the κ - Al_2O_3 , Ruppi et al., discloses² that:

CVD κ - Al_2O_3 coatings are composed of columnar grains, the favoured growth direction being along 001. The columnar κ - Al_2O_3 coatings can be deposited to a considerable thickness ($> 10 \mu\text{m}$), without any changes in the phase content or crystallinity.

At page 58, the Ruppi et al. article states:

All the κ - Al_2O_3 coatings deposited at different process conditions exhibited the typical columnar structure of κ - Al_2O_3 [3, 18], with grains that could be oriented throughout several layers.

Applicants submit that the “bottom line” of the Ruppi et al. article is that all it discloses is that the κ - Al_2O_3 coating layers exhibit columnar grain morphology since as

² Citing reference [3] which is Vuorinen et al., Thin Solid Films pp 193-94 (1990) 536.

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set forth in the conclusions, the various parameters, "... did not effect the general microstructure or morphology of κ - Al_2O_3 ." See page 60.

Claim 8 recites the coating as follows:

... a kappa-alumina coating layer that exhibits either a lenticular grain morphology or a polyhedra-lenticular grain morphology at the surface of the kappa-alumina coating layer.

This claim calls out that the kappa-alumina coating layer must exhibit one of two grain morphologies. Based upon the face of the document, the columnar grain morphology of the Ruppi et al, article is not "lenticular" or "polyhedra-lenticular". Thus, applicants submit that the Ruppi et al. article cannot inherently anticipate the claimed invention of claim 8.

Claims 9, 11, 13 and 14 depend from claim 8, and applicants submit these claims are allowable for the reasons advanced in support of claim 8. In addition, claim 14 calls for a base coating layer of alumina. The Ruppi et al does not disclose this aspect, and thus, applicants submit that Ruppi et al. cannot anticipate claim 14.

As set forth above, independent claim 29 calls for, as one alternative:

... a kappa-alumina coating layer having either a lenticular grain morphology at the surface thereof or a polyhedra-lenticular grain morphology at the surface thereof, ...

This is distinct from the Ruppi et al article, which on its face discloses columnar grain morphology of κ - Al_2O_3 . Hence, the Ruppi et al. article cannot inherently anticipate the invention of claim 29.³ Claim 30 depends from claim 29. Claim 30 should be allowable for all of the reasons advanced in support of claim 29.

³ Claim 29 calls for two other alternatives, which are (1) an alpha-alumina coating layer having a platelet grain morphology at the surface thereof, and (2) an alpha-kappa-alumina coating layer having either a large multifaceted grain morphology at the surface thereof or a polyhedra-multifaceted grain morphology at the surface thereof. It is clear that the columnar grain morphology of κ - Al_2O_3 , cannot inherently anticipate either one of these alternatives.

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Claim 22 calls for coating layers wherein each different coating layer requires certain grain morphology. These coating morphologies are along the lines of those set forth in claim 29. For reasons like those set forth in connection with the argument against claim 29, applicants submit that claim 22 is allowable over the Ruppi et al. article.

Claim 24 depends from claim 22. Claim 22 should be allowable for all of the reasons advanced in support of claim 22.

Paragraph 8 Rejection – under 35 USC §102(b)

The Examiner has rejected claims 15, 16, 22 and 25 as being anticipated under 35 USC §102(b) by the article to Yi-Feng et al. The Examiner argued that, “[Y]i-Feng et al discloses the claimed alumina layer on a substrate. The morphology of the alumina layer is considered inherent to the way the layer is made.” Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

The Yi-Feng et al. article pertains to formation of an α -Al₂O₃ coating layer on a platinum interlayer wherein the application appears to be with regard to thermal barrier coatings in “hot section” turbine components in revenue-generating aircraft. At page 2095, the article concluded that:

The characterization results showed that the phase contents and morphology of the CVD-Al₂O₃ coating were strongly dictated by the substrate. The coating directly deposited on René N5 consisted of α -Al₂O₃ crystals of 0.5-1.5 μ m in a glassy, discontinuous matrix phase of amorphous α -Al₂O₃. On the other hand, the coating on Pt-plated René N5 contained α -Al₂O₃ crystals of 0.1-1 μ m and with a minute amount of κ -Al₂O₃. The coating on pure Pt was a κ -Al₂O₃ along with a trace amount of α -Al₂O₃, but with the formation of a major amount of Pt₃Al at the coating/substrate interface.

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Claim 15 calls for:

... a coating scheme on the substrate wherein the coating scheme includes an alumina coating layer that contains alpha-alumina and kappa-alumina, and wherein the coating layer exhibits either a large multifaceted grain morphology or a polyhedra-multifaceted grain morphology at the surface of the alumina coating layer.

Claim 15 requires that the coating contain both alpha-alumina and kappa-alumina. The closest that Yi-Feng et al. comes to this coating is the coating on pure Pt, which comprised κ -Al₂O₃ along with a trace amount of α -Al₂O₃. Applicants submit that a document that teaches a trace amount of α -Al₂O₃ cannot anticipate the claimed invention of claim 15. In addition, there is nothing in Yi-Feng et al. that addresses the grain morphology, i.e., "...the coating layer exhibits either a large multifaceted grain morphology or a polyhedra-multifaceted grain morphology at the surface of the alumina coating layer..." Applicants respectfully submit that Y-Feng et al. cannot anticipate the invention per claim 15.

Claim 16 depends from claim 15 and is allowable for all of the reasons advanced in support of claim 15. Further, Table I in Yi-Feng et al. shows a temperature equal to 1020 °C. Clearly, this is not within the range of 750-920 °C called for by claim 16. In addition to the fact that claim 16 depends from claim 15, claim 16 also calls out a temperature range not addressed by Yi-Feng et al. and thus is allowable for Yi-Feng et al.

Claim 22 calls for the coating layer to be applied:

... and the coating layer being applied by chemical vapor deposition at a temperature ranging between about 750 degrees Centigrade and about 920 degrees Centigrade.

As set forth above, Table I of Yi-Feng et al. recites a temperature equal to 1020 °C. Clearly, this is not within the range of 750-920 °C called for by claim 22. It seems clear that Yi-Feng et al. cannot anticipate claim 22.

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Claim 25 depends from claim 22 and is allowable for all of the reasons advanced in support of claim 22. Further, the fact that Y-Feng et al. teaches only a "trace" of α -Al₂O₃, supports the position that Yi-Feng et al. cannot anticipate claim 25 which calls for an alpha-kappa alumina coating layer.

Paragraph 10 Rejection under 35 USC §103(a)

The Examiner has rejected claim 7 as being unpatentable under 35 USC §103(a) over Ljungberg alone. Applicants respectfully submit that claim define allowable subject matter. First, claim 7 depends from claim 1, and is allowable for all of the reasons advanced in support of claim 1. Also, claim 7 calls for a base coating layer of alumina. While the Examiner essentially states that the use of an alumina base layer, "... is known in the coating art to provide additional performance of the coated substrate", applicants that the Examiner must cite support for this conclusion. Applicants request the removal of the rejection of claim 7 and the allowance of this claim.

Paragraph 11 Rejection under 35 USC §103(a)

The Examiner has rejected claim 3 as being unpatentable under 35 USC §103(a) over Ljungberg taken in view of the article by Colmbier et al. or U.S. Patent No. 5,700,569 to Ruppi et al. Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

First, claim 3 depends from claim 1, and thus, is allowable for all of the reasons advance din support of claim 1.

Second, neither the article to Colmbier et al. nor the Ruppi patent address the specific multi-layer scheme set forth in claim 3. In this regard, claim 3 adds limitations to claim a multi-layer coating scheme with a recited base coating layer, a recited intermediate coating layer on the base coating layer, a recited modification coating layer on the intermediate coating layer, and the alpha-alumina coating layer on the modification

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coating layer. All Colmbier et al does is disclose the simultaneous deposition of different phases. At page 462, Colmbier et al. says:

The aim of this work is to study in more detail the possibilities of combining two refractory materials within a coating in a different way. This will not be done as a "multilayer" but as a "mixed layer", i.e., the deposition of both phases occurs simultaneously side by side in a compacted layer.

At page 468 the article concludes:

The coatings consist of relatively large, faceted of α -Al₂O₃ crystals containing some titanium and surrounded by a fine grained titanium oxycarbide matrix. Two main titanium-oxycarbide compositions were found.

It is clear that Colmbier et al. does not address the multiple layers as set forth in claim 3.

The '569 Ruppi patent does not appear to address the multiple coating layer scheme as set forth in claim 3. At Column 2, lines 48-62, the '569 Ruppi patent reads:

While the layers may be simply applied one on top of the other, it has been found that when κ -alumina is the desired form of the aluminum to be deposited, that the surface of the underlying alumina layer (whether α or κ) should contain a thin modification layer to insure the nucleation of κ -aluminum as the next coating. A modification layer is not necessary (and is generally deleterious to adhesion) between the thin intermediate layer (e.g., TiC, TiN, and/or Ti(C,N) and the first κ -alumina layer. There is a bonding layer between the intermediate layer and the κ -alumina layer on the substrate after the heat treatment, e.g., the bonding layer can be any of the materials which would help adhere and the knowledge of which is in the purview of one of ordinary skilled in the art.

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It is clear that the modification layer of the '569 Ruppi patent does not equate to the arrangement of claim 3

Overall, applicants solicit the removal of the rejection and the allowance of claim 3.

Paragraph 12 Rejection under 35 USC §103(a)

The Examiner has rejected claim 12 as being unpatentable under 35 USC §103(a) over the article to Ruppi. Applicants respectfully submit that claim 12 is allowable because it depends from allowable claim 8.

Paragraph 13 Rejection under 35 USC §103(a)

The Examiner has rejected claim 10 as being unpatentable under 35 USC §103(a) over the article to Ruppi taken in view of the article to Colombier et al. or the '569 Ruppi patent. Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

Claim 10 depends from claim 8 and is allowable for all of the reasons advanced in support of claim 8. Further, for reasons like those set forth above regarding the rejection of claim 3 using Colombier et al. and the '569 Ruppi patent, applicants submit that claim 10 allowable over the combination set forth by the Examiner.

Paragraph 14 Rejection under 35 USC §103(a)

The Examiner has rejected claims 18-21 as being unpatentable under 35 USC §103(a) over the article to Yi-Feng et al. alone. Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

First, claims 18-21 depend from claim 15, and hence, are allowable for all of the reasons advanced in support of claim 15.

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Second, Yi-Feng et al. does not address any of the substrates listed in claim 18. In the absence of any suggestion of such a substrate, especially in light of the fact that Y-Feng et al teaches the impact of the substrate upon the coating, renders Yi-Feng et al. ineffective as a reference against claim 18.

Third, Yi-Feng et al. does not address a cutting insert, but instead, addresses a part of a turbine. This difference causes Yi-Feng et al. to not address claim 19.

Fourth, Yi-Feng et al. does not teach coating layers on the principal coating layer. Thus, it cannot render claim 20 unpatentable.

Fifth, Yi-Feng et al. does not teach or suggest a base coating layer of alumina. Thus, it cannot render claim 21 unpatentable.

For the above reasons, applicants request the removal of these rejections and the allowance of these claims.

Paragraph 15 Rejection under 35 USC §103(a)

The Examiner has rejected claim 17 as being unpatentable under 35 USC §103(a) over the article to Yi-Feng et al. taken in view of the article to Colmbier et al. or the '569 Rупpi patent. Applicants respectfully submit that these claims define allowable subject matter for the reasons set forth below.

Claim 17 depends from claim 15, and thus, is allowable for the reasons advanced in support of claim 15. In addition, applicants reiterate the arguments against Colmbier et al. and the '569 Rупpi patent to support the position that these secondary documents cannot teach or suggest the multiple coating layer scheme of claim 17. Applicants request the removal of the rejection and the allowance of claim 17.

Conclusion

Applicants submit that the claims define allowable subject matter. Applicants solicit the issuance of a Notice of Allowance and Issue Fee Due and Notice of

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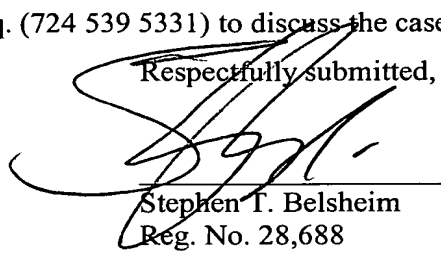
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Allowability. If the Examiner disagrees with the arguments, but has suggestions to place the claims in form for allowance, applicants urge the Examiner to contact the undersigned (615 662 0100) or Mr. John J. Prizzi, Esq. (724 539 5331) to discuss the case.

Respectfully submitted,



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